

from Cloudy to Clear

Talking About Water

Vocabulary and Images that Support
Informed Decisions about
Water Recycling and Desalination

Presented to:

Public Perceptions/Acceptance Working Group of
Governor Brewer's Blue Ribbon Panel on Water Sustainability

PRESENTED BY LINDA MACPHERSON | CH2M HILL

MAY 21, 2010





Study sponsored by

- The WaterReuse Foundation
- Association of Metropolitan Water Agencies
- Water Environment Foundation
- American Water Works Association
- US Environmental Protection Agency Office of Research and Development
- WaterCorp
- WaterReuse Association

With additional financial support from:

- City of San Jose, California
- PhRMA PIE Task Force
- Santa Clara Valley Water District, California
- Singapore PUB



With Participation From

- ACTEW, Canberra, Australia
- City of Albany, Oregon
- City of Oxnard, California
- City of San Diego Water Department, California
- City of Tampa, Florida
- Clean Water Services, Oregon
- Denver Water, Colorado
- El Paso Water Utilities, Texas
- Griffith University, Queensland, Australia
- Miami Dade Water & Sewer Department, Florida
- National Water Commission of Australia
- Water Corporation, Perth, Australia
- West Basin Municipal Water District, California



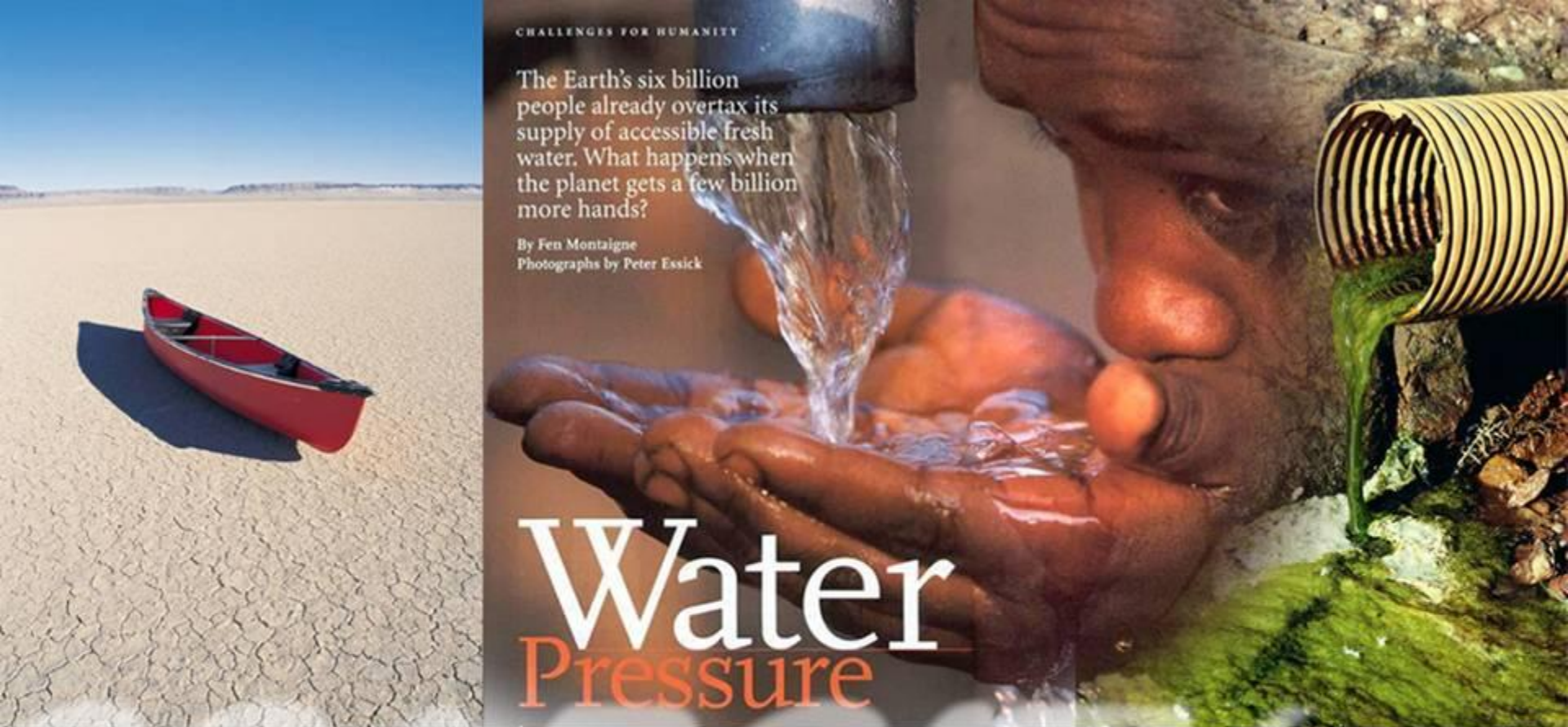
and WRF 07-03 Project Advisory Committee

- Wade Miller, WaterReuse Association
- Alan Roberson, American Water Works Association (AWWA)
- Eileen Leininger (acting on behalf of AMWA)
Paula Kehoe (acting on behalf of WEF)
- Chris Impellitteri, Ph.D., US EPA National Risk Management Research Laboratory
- Chris Hornback, National Association of Clean Water Agencies (NACWA)

The talk today will cover:

- Purpose and need for this research
- Methodology
- Research Findings
- Recommendations
- Next Steps





CHALLENGES FOR HUMANITY

The Earth's six billion people already overtax its supply of accessible fresh water. What happens when the planet gets a few billion more hands?

By Fen Montaigne
Photographs by Peter Essick

Water Pressure

Purpose and need for this research

We have a problem:

- Water scarcity is casting a shadow over the future viability of communities across nearly every continent

Purpose and need for this research



- We have the technology to reuse water to alleviate this growing crisis
- Lack of public acceptance shuts down reuse projects, often before they even get off the ground



Purpose and need for this research

Reused Wastewater Indirect Potable Reuse
THAT IS THE QUESTION!
Recycled Wastewater Influenced Waters

- Could it be that the vocabulary used by the industry to explain technology and the concept of reuse to the public actually inhibits public understanding and results in non-acceptance?

STIGMA!

- Opponents of water recycling are aware of the stigmatizing effects of language
- The use of words that magnify fears is invariably more powerful than countervailing efforts to emphasize facts



...fling adj : produc
HAMPERING <~ heat>
A.Lester> — **sti·fling**
stig·ma \ 'stigmə\ n,
stig'ma|, stig'mäl, |tə\ ó
brand, fr. Gk, mark, tatu
at STICK] 1 a *archaic* : a
a burning iron is put on
... — Samuel

*Nemesis
the Goddess
of conflict*



Exploration of related issues

- What do people understand about water science?
- Does improved knowledge enhance acceptance?



**Are we guinea
pigs?**



Research methodology

- Review of published materials
 - Community outreach and education materials
 - Examples of survey research conducted between 1987 and 2009
 - Outreach and education guidance documents
 - Terms and definitions used within the industry
 - Images and phrases used by the media
- Quantitative investigation: web-based survey
- Qualitative investigation: focus groups in the US and Australia

Community Outreach and Education Materials



Community outreach and education materials

- Terminology was used inconsistently even within the same organization
- Few attempts were made to ensure the information was interesting - the reading ease of much of the material was equivalent to the fine print of an insurance policy
- It is assumed that technical words are sufficient to create community understanding and reassurance





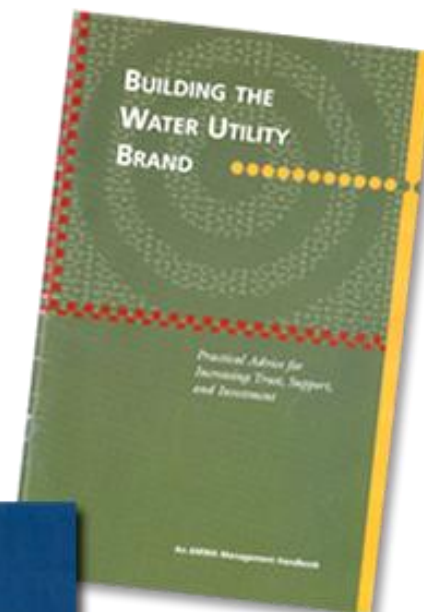
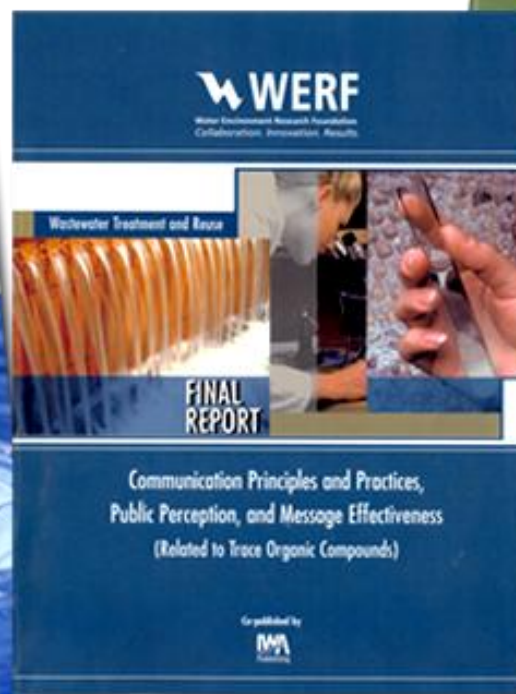
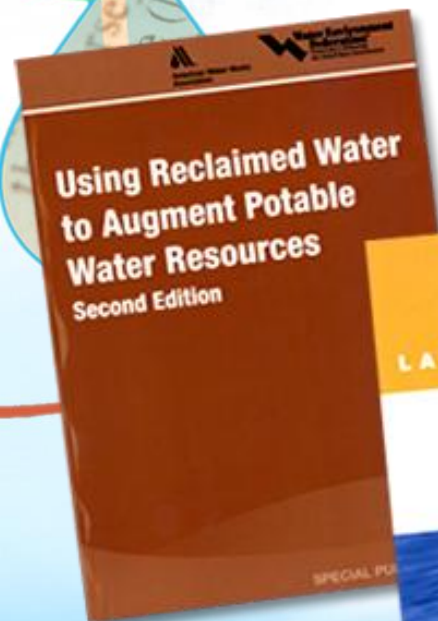
Community outreach and education materials

- The various parts of the water cycle were treated separately - the subject of water recycling was rarely considered in the broader context of the water cycle
- The material examined was not always accurate

Outreach and Consultation Guidance

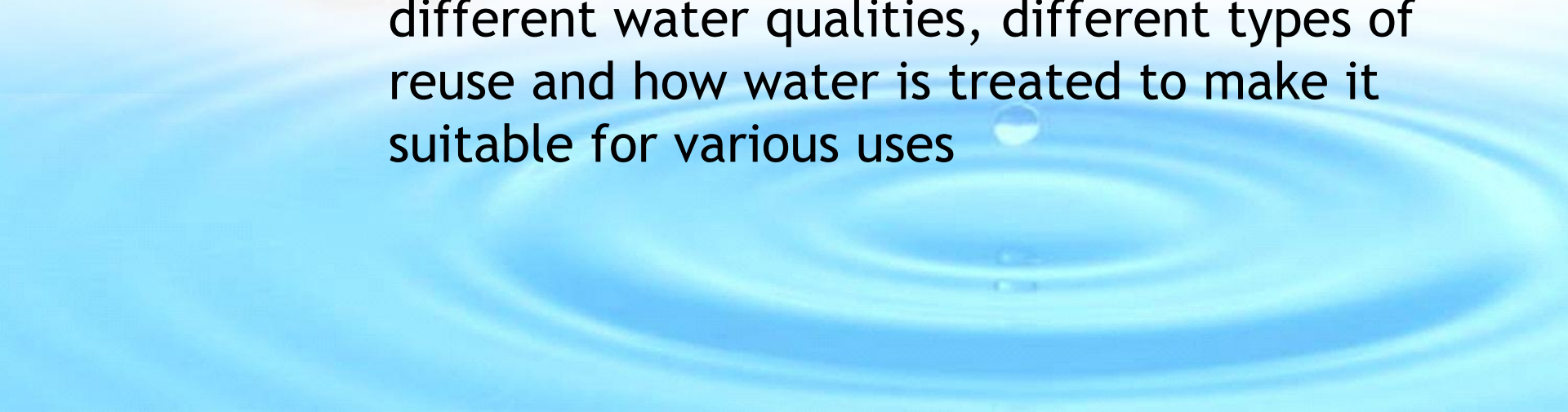


Outreach & consultation guidance





Outreach & consultation guidance

- While there is much to recommend in these documents, there are a number of gaps:
 - although they invariably mentioned the need to provide information, they did not detail what information should be available nor how it should be delivered
 - there were no terms or images to explain different water qualities, different types of reuse and how water is treated to make it suitable for various uses
- 

Quantitative Survey Research



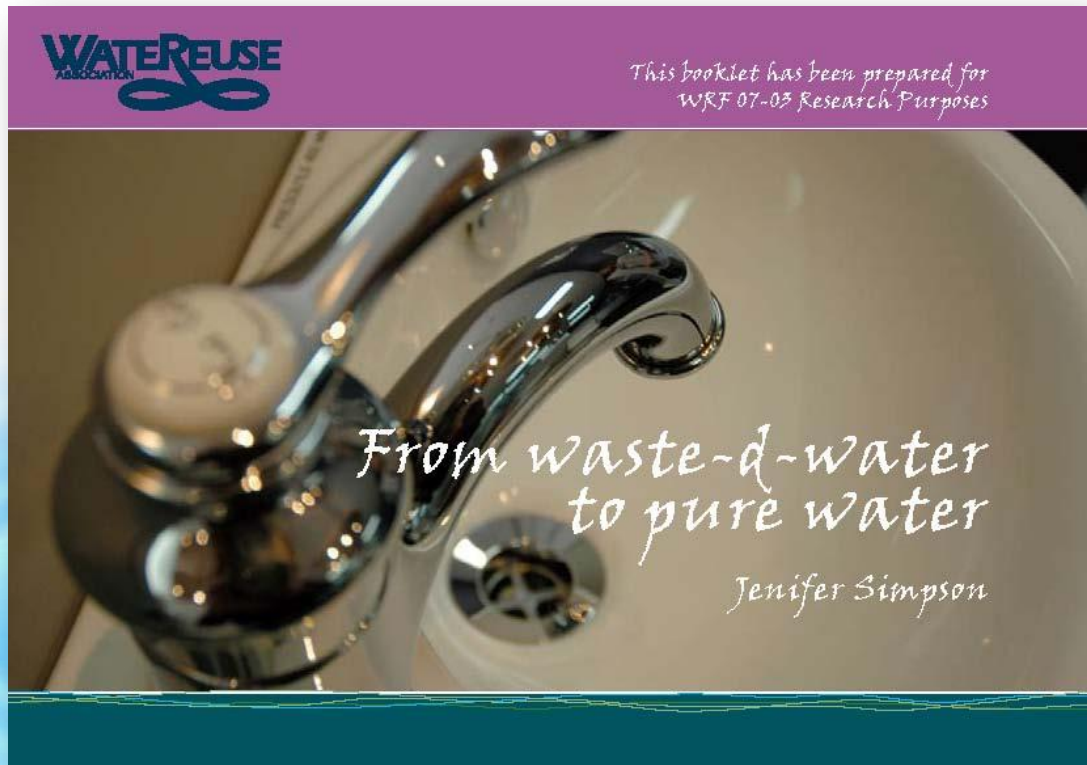
Quantitative Survey Research

- Testing the impacts of information:
 - half of the individuals surveyed received on-line information about water science, but the other half did not receive any accompanying information



Quantitative Survey Research

- The information provided was an on-line copy of the booklet ***From waste-d-water to pure water***



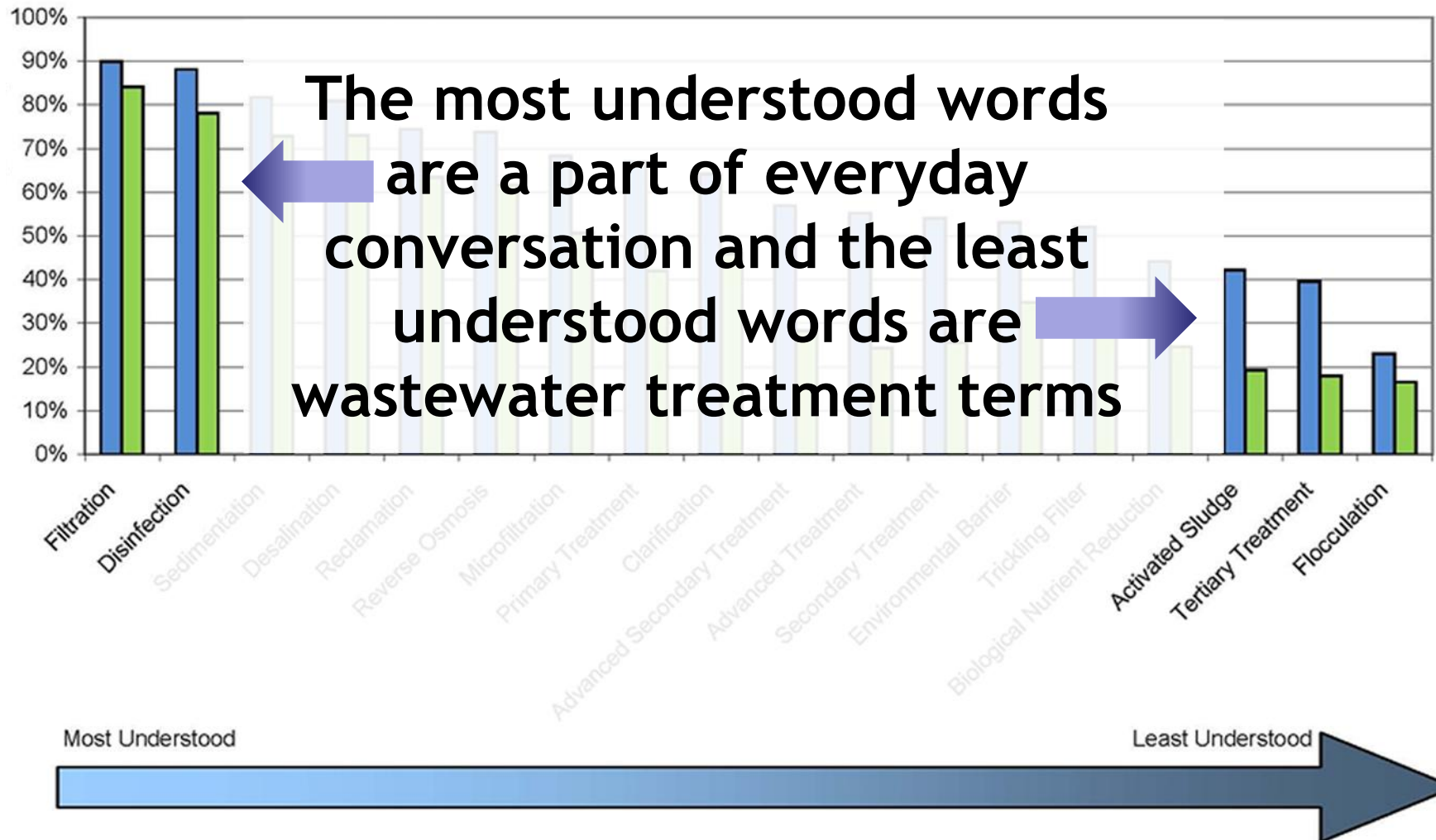


Quantitative Survey Research

The question was:

- *There is a variety of terms used to describe the processes used to clean wastewater and water. Rate from 1 to 4 how well you understand the terms.*
 - 1 = I have never heard of the term
 - 2 = I have heard of the term but do not know what it means
 - 3 = I have some understanding the term
 - 4 = I understand it well enough to explain it

Percent respondents who indicated they have some understanding of the term, or understood it well enough to explain it





Quantitative Survey Research

The question was:

- *Which are the most important factors to ensure the safety of your drinking water supply?*
 - Water treatment technology
 - Monitoring finished water
 - Identifying pollution sources
 - Residual disinfection
 - Raw water quality

What factors ensure drinking water safety?

Factor	With information	Without information
Water treatment technology	84%	85%
Monitoring finished water	84%	84%
Identifying pollution sources	56%	64%
Residual disinfection	42%	49%
Raw water quality	23%	29%



The industry assumes...

...the public thinks the quality of raw water is most important for safety.



The reality is...

...the public actually thinks that water treatment and monitoring are more important for safety.



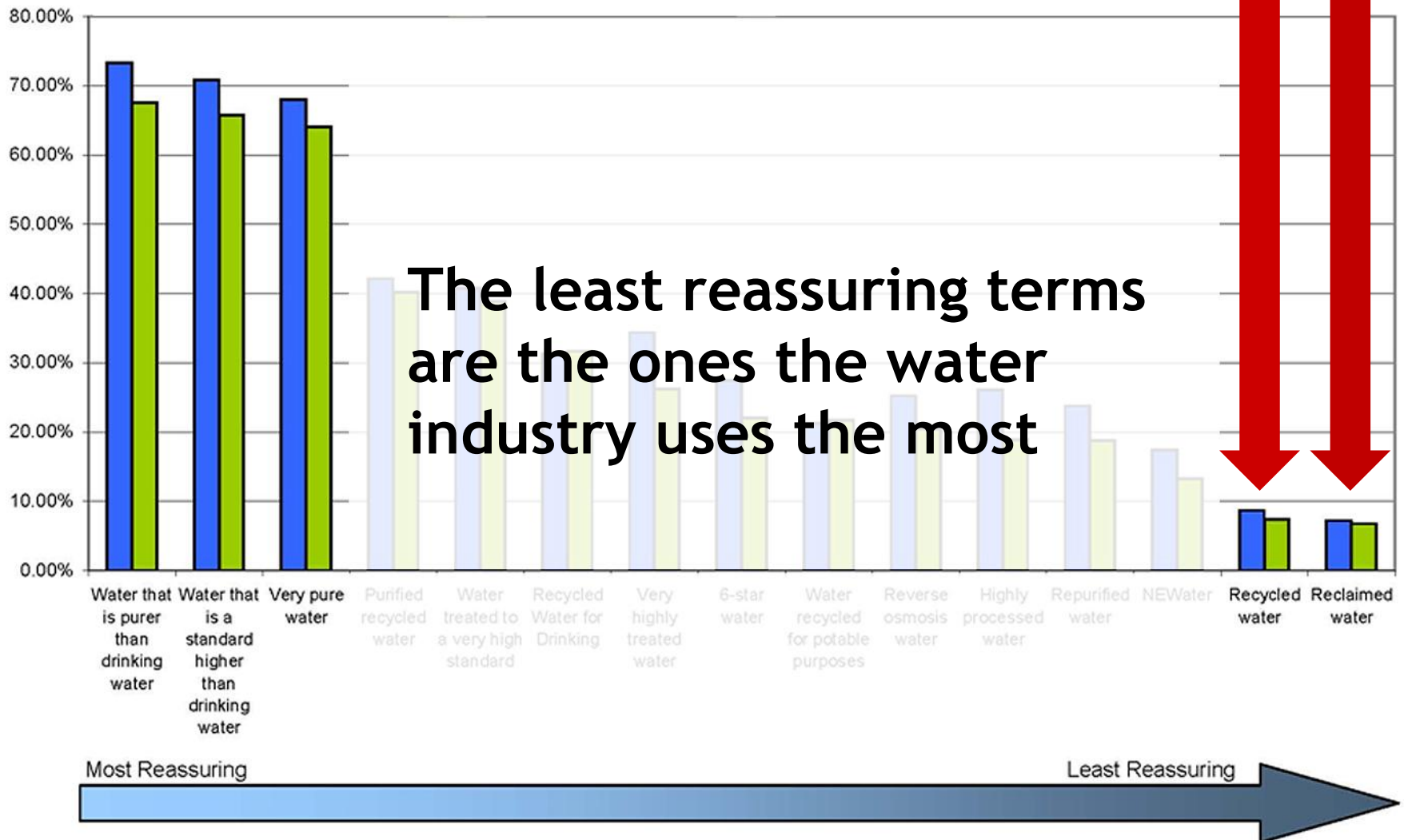


Quantitative Survey Research

The question was:

- *Several names have been suggested for the water produced at the reclamation plant that is as pure as modern technology can make it, for recycling back to the drinking supply. Please rate the terms that you consider would most positively reassure the public of its safety and high quality.*

Percent respondents who feel the term is reassuring or very reassuring





Information helped

- Information increased understanding of the terms used to describe water and wastewater treatment processes
- It increased understanding that there are different qualities of water that can be reused for different purposes
- It increased willingness to drink water that was known to be used before

Information → Understanding → Acceptance



Qualitative Focus Group Research



Qualitative Focus Group Research

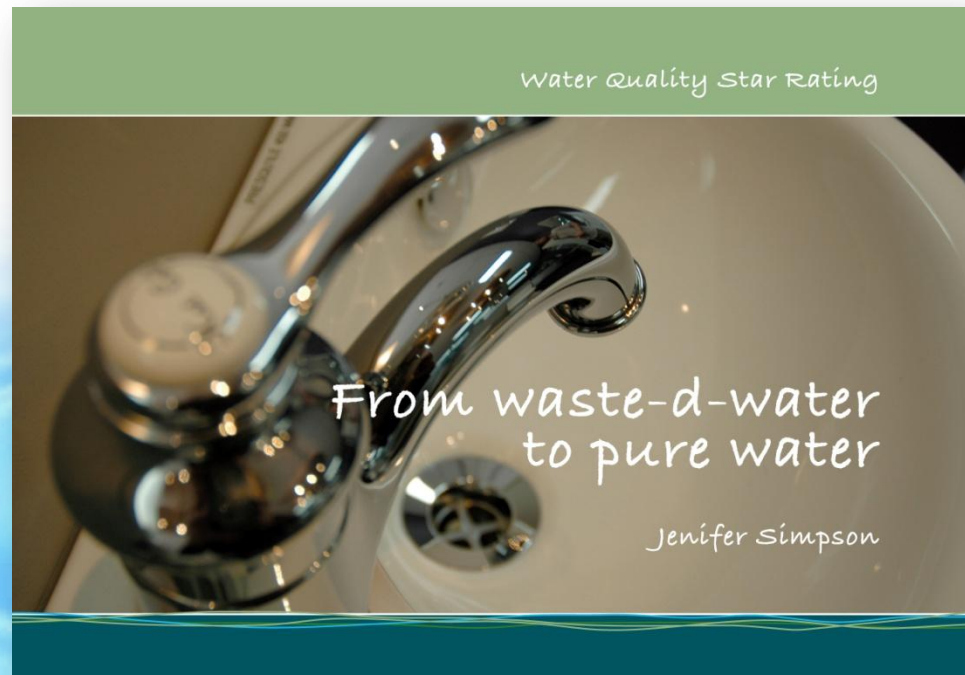
- Focus group meetings were held in Santa Clara Valley Water District/City of San Jose, Tampa and Perth





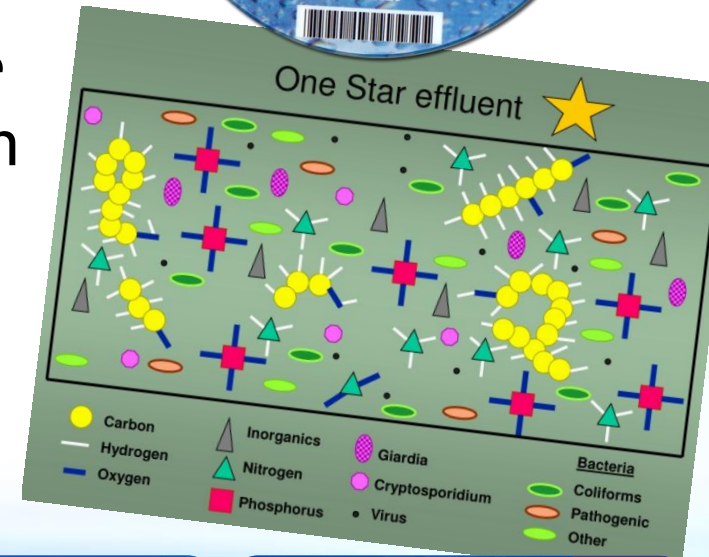
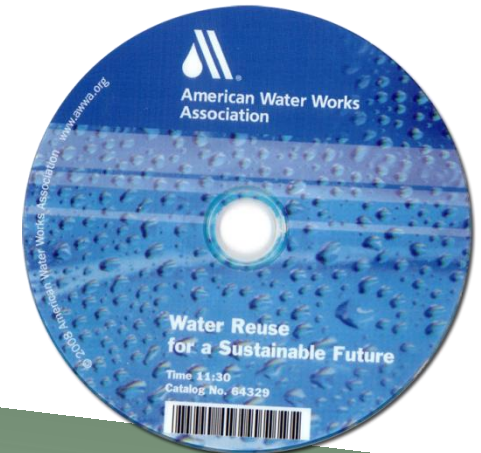
Qualitative focus group research

- The same agenda and vocabulary were used in all presentations
- All participants were given a copy of the ***From waste-d-water to pure water*** booklet that included the star rating (the Perth attendees received the booklet by mail in advance of the meeting)




Focus group investigations explored the following issues

- Did the AWWA video on all types of water reuse, a personal tutorial and/or the interactive information from the NEWater Visitor Centre help people understand and become more accepting of water recycling?



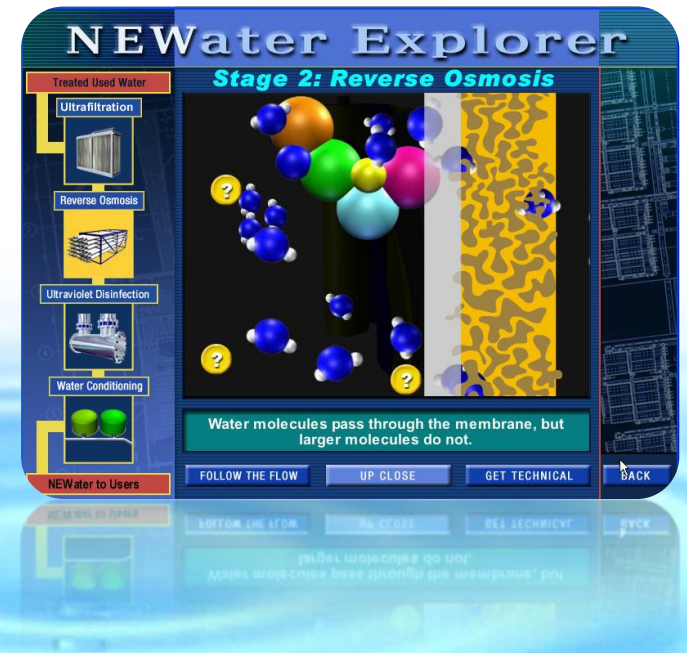
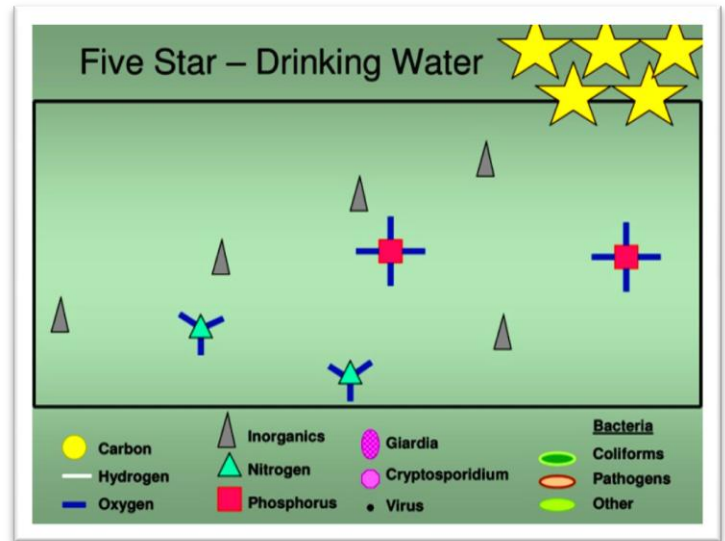


Focus group investigations explored the following issues

- Does the knowledge that water purer than drinking water can be produced raise the expectation that this quality of water should be available for all uses?
 - Is it true that ‘the community doesn’t want to know and doesn’t have time to learn about water science’? (AWA Rain Gauge, 2007)
- 

Focus group outcomes

- The presentations received positive comments, particularly the personal tutorial *From waste-d-water to pure water*
- The graphics from the NEWater Explorer program were noted to clearly communicate how membranes work to protect public health





Focus group outcomes

- There was an obvious link between the clear presentation from a knowledgeable presenter coupled with a visual, interactive explanation of the technology and the attendees' understanding of water science and their acceptance of water recycling





Focus group outcomes

- The attendees responded more positively to being provided with a greater depth of information about water, as opposed to the general video whose aim was to explain reuse and establish that the industry may be trusted to provide various qualities of recycled water
- Generic information was regarded as marketing and mistrusted

**BRANDING WITHOUT INFORMATION
MAY NOT BE THE ANSWER**



Focus group outcomes

- The very positive responses showed that the audiences were very interested in learning and talking about water

“The public generally doesn’t wish to know, nor has the time to learn the detailed science involved in indirect potable reuse.”

(AWA Rain Gauge 2007)

DISPROVEN



Focus group outcomes

- The attendees said it was important that a range of material be available to suit all learning styles
- They felt strongly that technical information must be available, even if only a minority of people wanted to study it



**I want more
technical
information**

Focus group outcomes

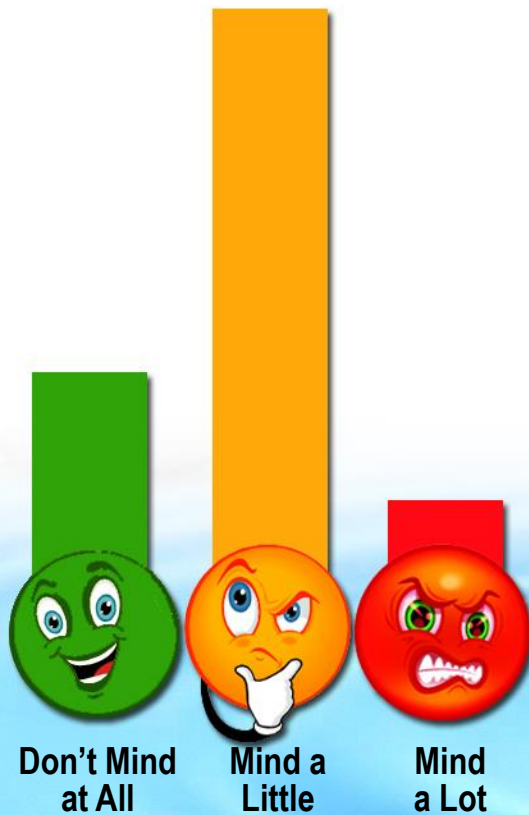
Wastewater is mostly water—a 53-gallon drum of it contains only about one tablespoon of 'dirt'



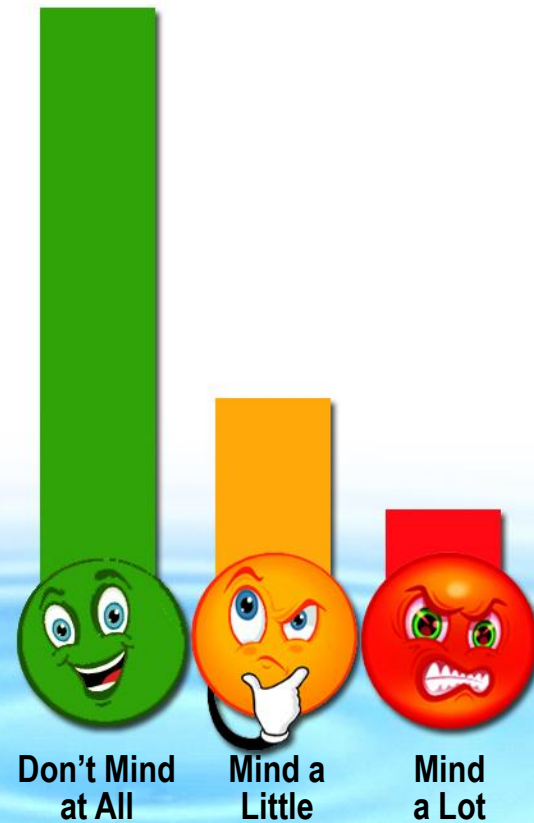
- Technical information should be 'simple enough to understand yet technical enough to trust'
- Information should be available on all the options available for managing water (for example: conservation, desalination, reuse)
- Cost was an important issue for many

Focus group outcomes

BEFORE



AFTER



Conclusions





Conclusions

- The community's knowledge of water science, particularly wastewater, is low
- Increased knowledge improves understanding and acceptance of reclaimed water

Information → Understanding → Acceptance



Conclusions

- Words matter!
 - Stigmatizing words such as sewage and wastewater deter people from accepting reuse whereas positive words, especially 'pure' and its derivatives, enhance acceptance

*Hestia
the Goddess
of purity*

Pure

1 : unmixed with any other matter <pure gold>
2 : free from dust, dirt, or taint ; 3. Free of foreign elements. 4. Containing nothing inappropriate or extraneous: a pure literary style. 5. Complete; utter: pure folly.

stigma *n.* a mark, a brand, fr. Gk, mark, tatt
[at STICK] 1 a archaic : a
burning iron is put on

Nemesis
*the Goddess
of conflict*



Conclusions

- The terms used to describe water quality are imprecise and used inconsistently

Wastewater

Contaminants

Emerging Pollutants of Concern

Activated Sludge Plant

Toxins

Sewage

Pipe to pipe

Effluent

Preliminary/primary/secondary/treatment

Recycled wastewater

Toilet to tap

Maximum contaminant limits

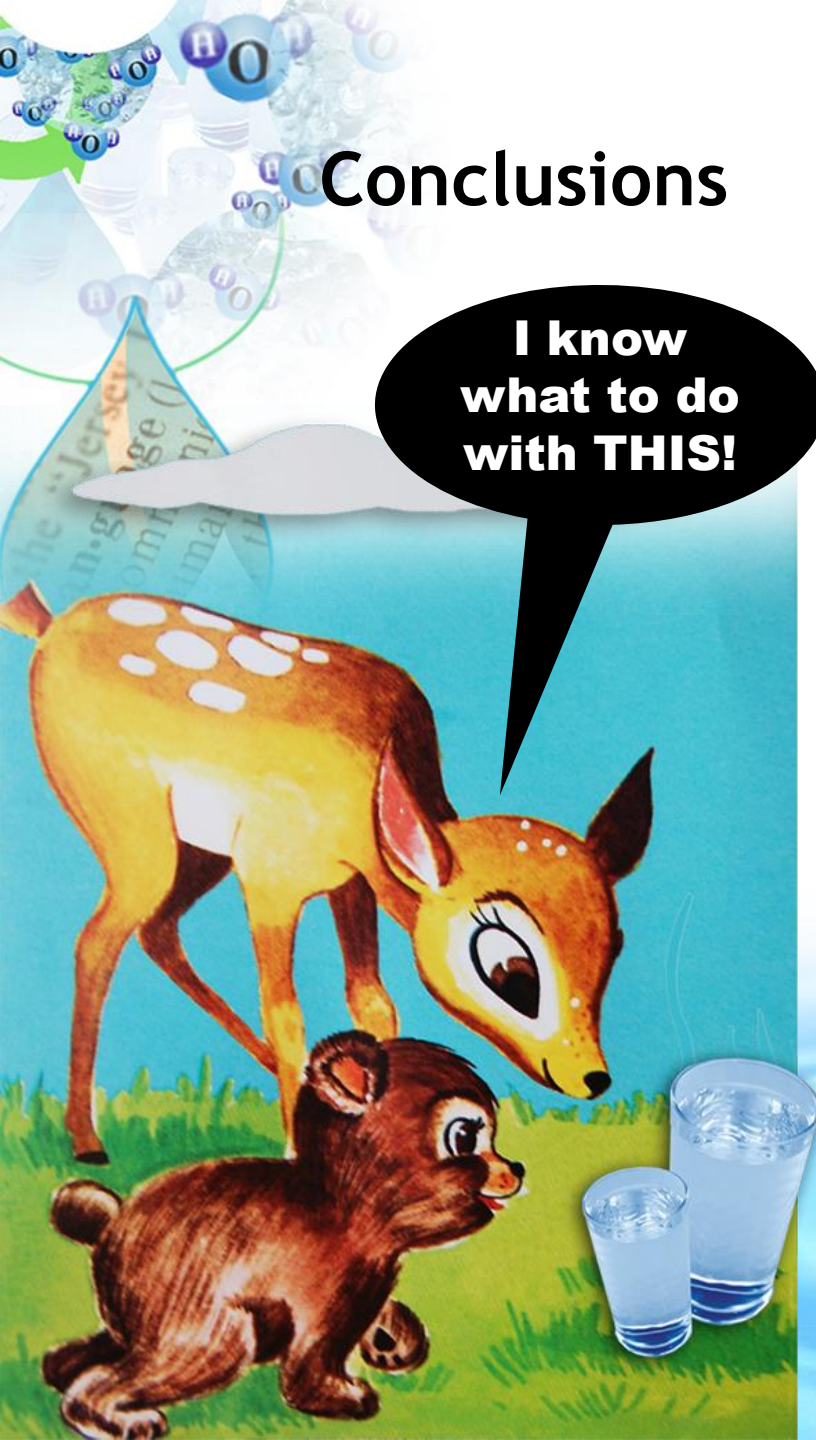
Direct/indirect potable recycling



Conclusions

**I know
what to do
with THIS!**

- Words currently in use describe water quality by its history, its source, and degree of treatment, but the community relates to what the water can safely be used for



Recommendations



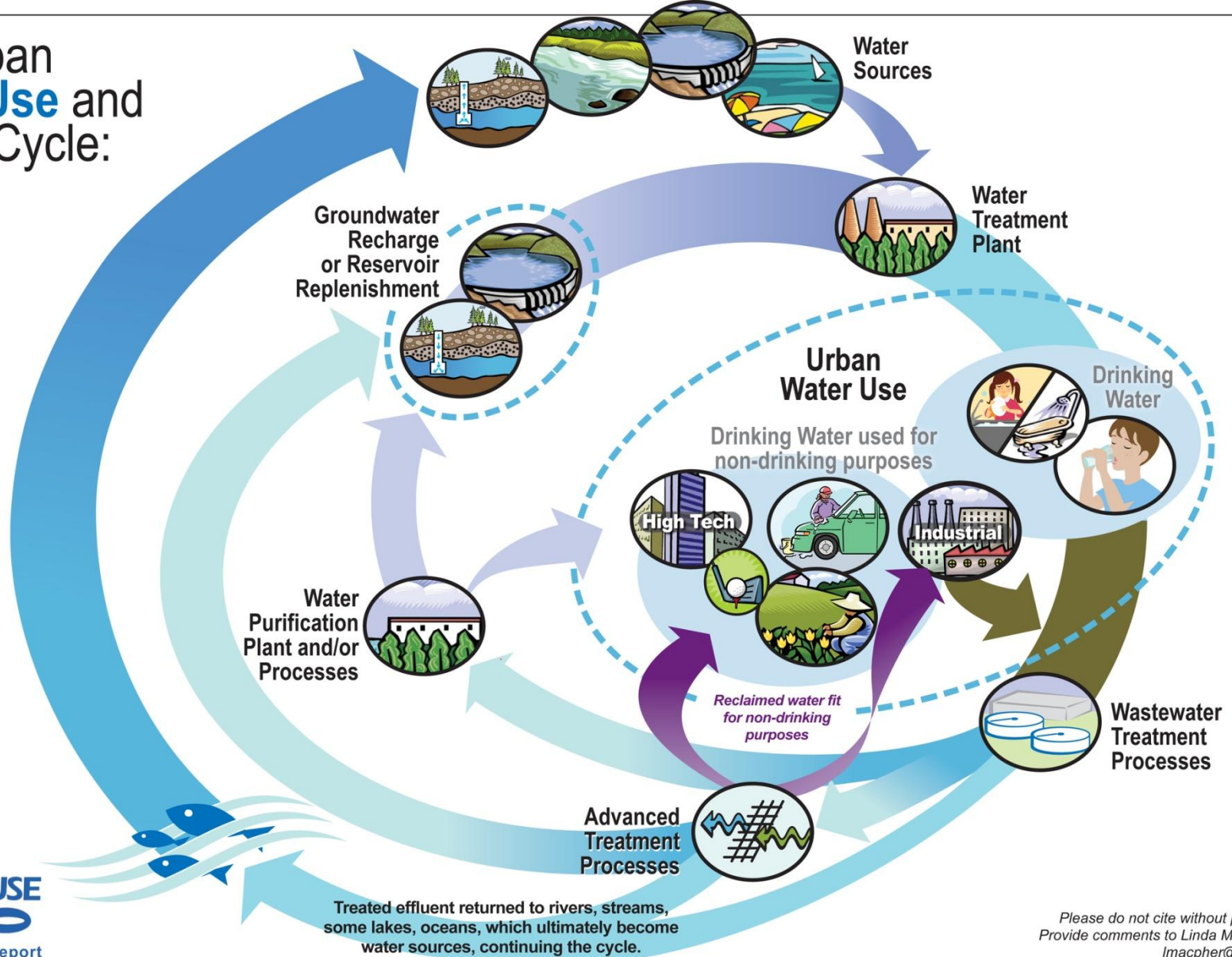


Recommendations

- Information that is easy enough to understand but technical enough to trust!
 - an interactive, graphic glossary with easy to understand, non-stigmatizing language
 - the ability to drill down into the technical information

The Urban Water Use and Reuse Cycle:

This graphic depicts some of the many possibilities. Incorporating sustainability review can inspire a sustainable water future.



WRF 07-03 Draft Report

384155.01.05 Water_UrbanCycle_Rev3_5-18-2010 cts/klk

Please do not cite without permission.
Provide comments to Linda Macpherson.
lmacpher@ch2m.com

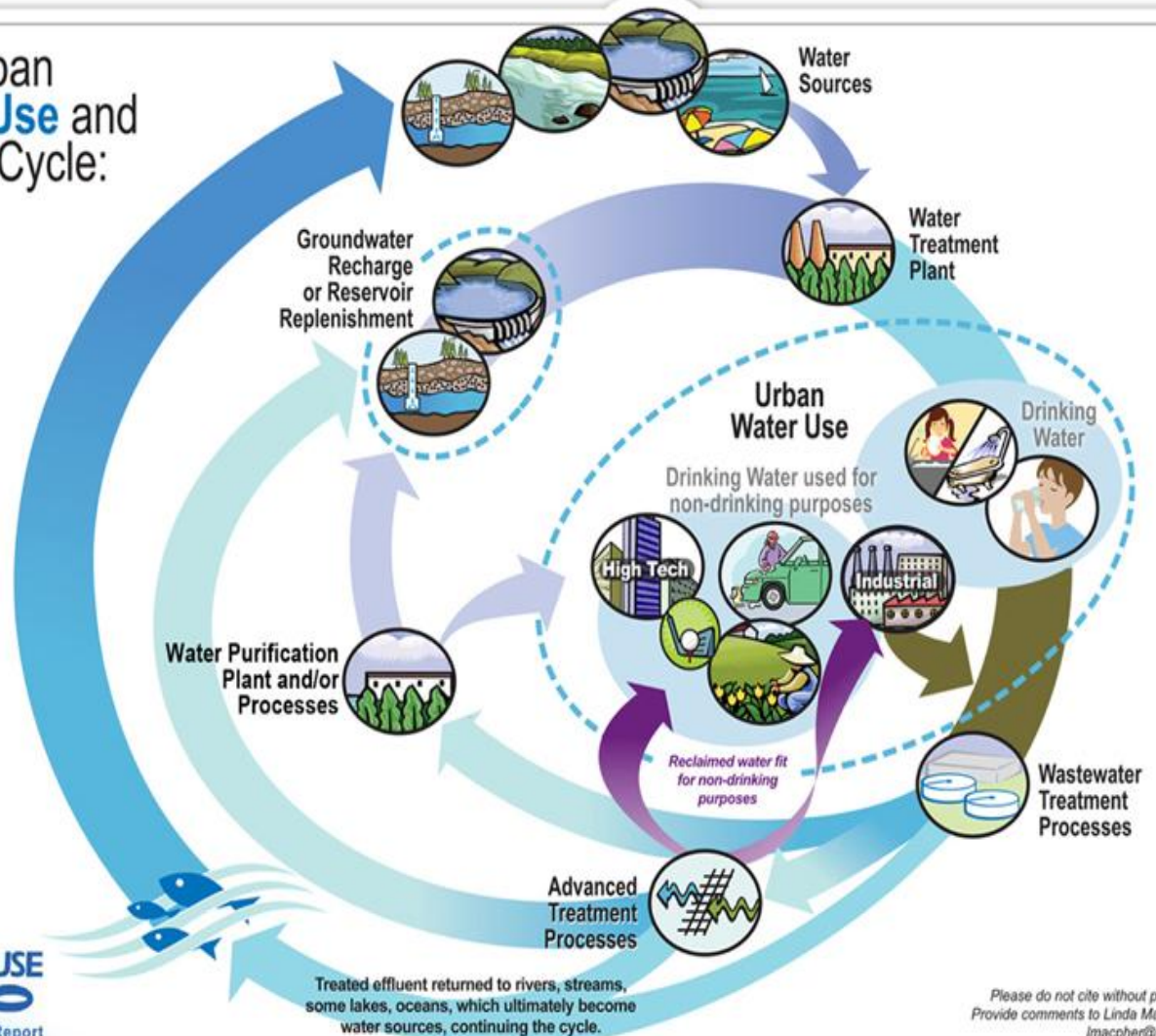
Recommendations: We need to create a simple water cycle glossary that puts use and reuse in context

The Urban Water Use and Reuse Cycle:

This graphic depicts some of the many possibilities. Incorporating a sustainability review can inspire a sustainable water future.

Initial Screen

Scroll Over the Urban Water Use and Reuse Cycle to reveal descriptions of each phase and positive glossary term in the cycle



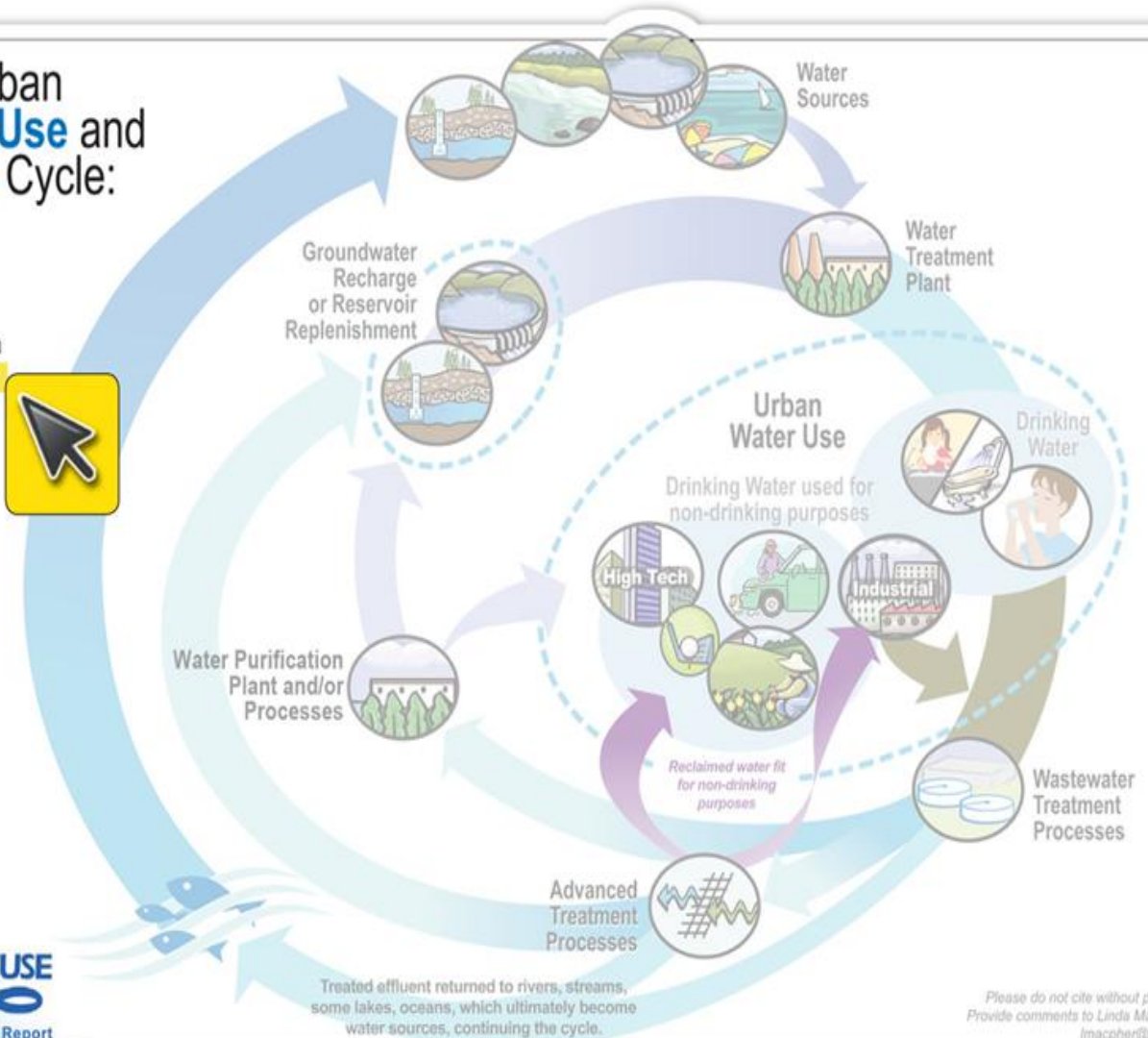
Start Here: A Sustainability Review inspires the right solutions for the future

The Urban Water Use and Reuse Cycle:

This graphic depicts some of the many possibilities. Incorporating a sustainability review can inspire a sustainable water future.



WRF 07-03 Draft Report



Please do not cite without permission.
Provide comments to Linda Macpherson.
lmacpher@ch2m.com



Sustainability review puts decisions in context

The Urban Water Use and Reuse Cycle:

This graphic depicts some of the many possibilities. Incorporating a sustainability review can inspire a sustainable water future.



WRF 07-03 Draft Report

Sustainability Review WATER RECYCLING TREATMENT OPTIONS

The urban water cycle and all the various treatment options presents a complex scheme. Understanding and incorporating this complexity requires consideration of all options to facilitate the delivery of sustainable water services.

The cornerstone of a sustainability review is the triple bottom line assessment of:

- 1) environment, greenhouse gas emissions, energy requirements, receiving water impacts, solids generation
- 2) society – public health, acceptance
- 3) economics. total life cycle costs

The options should be considered and evaluated in the context of the total water cycle and be based on science not perceptions. Information regarding scientific and technical aspects of water management must be shared before asking the public how they would prefer their water to be managed.

The analysis should yield a balanced perspective rather than being driven by any singular perspective or by the stigma and fear that frequently confronts reuse planning. The ultimate solution will not be a given. Each situation will be different.

Active links to definitions are threaded through the text, offering viewers options to explore and learn.



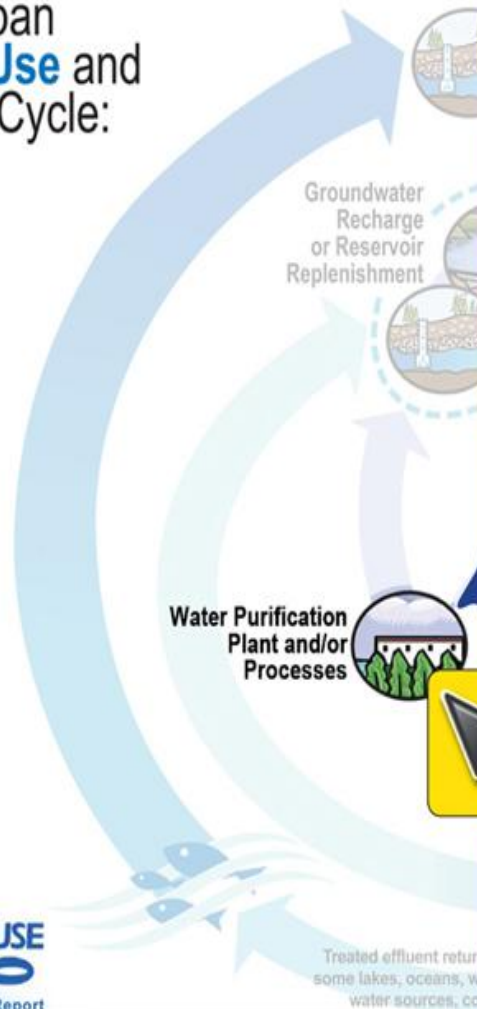
Water Purification Plant and Purification Processes

Background fades as viewer scrolls over the different phases of the water use and reuse cycle. For example, when the viewer scrolls over the icon for **Water Purification Plant and Purification Processes**, explanatory text appears.

The Urban Water Use and Reuse Cycle:

This graphic depicts some of the many possibilities. Incorporating a sustainability review can inspire a sustainable water future.

WATER REUSE
FOUNDATION
WRF 07-03 Draft Report



Water Purification Plants and Water Purification Processes

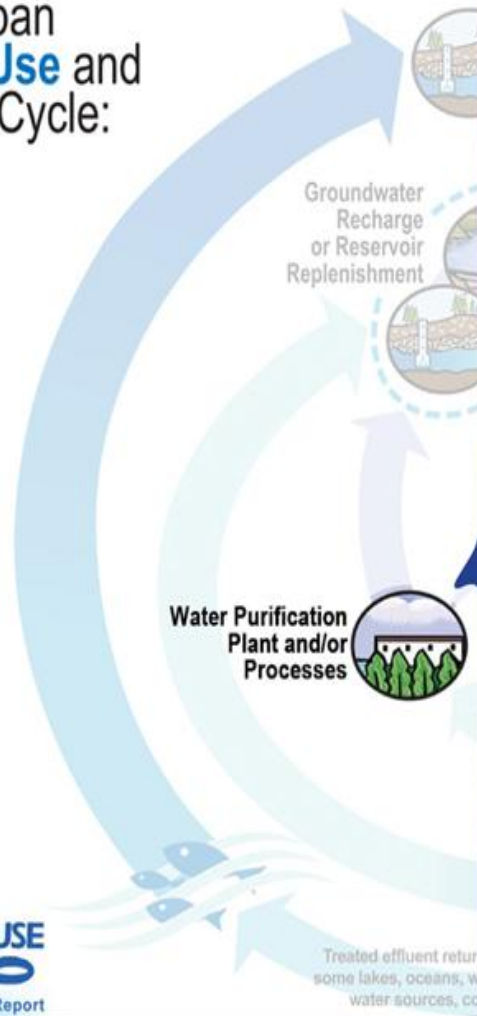
Water purification plants and water purification processes are used by some communities to maximize the sustainability of their raw water supplies. Strategies vary from the discharge to surface storage reservoirs or to **groundwater** aquifers for drinking water supplies to using the water for high tech industries. Water purification processes are used where very high quality water is required such as in pharmaceutical manufacturing and computer chip washing and on the space station where they are used to produce drinking water.

The purification processes employed vary from wastewater nutrient reduction treatment followed by **advanced treatments** wastewater treatment followed by constructed wetland and/riverbank filtration or even wastewater treatment followed a **water purification plant**. At some water purification plants, effluent undergoes **multi-barrier treatments** such as membrane filtration, reverse osmosis, advanced oxidation, chemical clarification, ozonation, activated carbon adsorption and final disinfection. The water produced by such treatments together is of such high quality that it can be used to replenish drinking water supplies directly though this is, as yet, rarely done.



The Urban Water Use and Reuse Cycle:

This graphic depicts some of the many possibilities. Incorporating a sustainability review can inspire a sustainable water future.



Glossary Links

Key words are shown in light blue in the description of each phase and are linked to the positive-terminology glossary.

Water Purification Plants and Water Purification Processes

Water purification plants and water purification processes are used by some communities to maximize the sustainability of their raw water supplies. Strategies vary from the discharge to surface storage reservoirs or to **groundwater** aquifers for drinking water supplies to using the water for high tech industries. Water purification processes are used where very high quality water is required such as in pharmaceutical manufacturing and computer chip washing and on the space station where they are used to produce drinking water.

The purification processes employed vary from wastewater nutrient reduction treatment followed by **advanced treatments** to wastewater treatment followed by constructed wetland and/or riverbank filtration or even wastewater treatment followed by a **water purification plant**. At some water purification plants, effluent undergoes **multi-barrier treatments** such as membrane filtration, reverse osmosis, advanced oxidation, chemical clarification, ozonation, activated carbon adsorption and final disinfection. The water produced by such treatments together is of such high quality that it can be used to replenish drinking water supplies directly though this is, as yet, rarely done.



Glossary definitions appear when a user clicks the key word.

The Urban Water Use and Reuse Cycle:

This graphic depicts some of the many possibilities. Incorporating a sustainability review can inspire a sustainable water future.

WATER REUSE
FOUNDATION

WRF 07-03 Draft Report

Groundwater Recharge or Reservoir

MULTI-BARRIER TREATMENTS

The treatment processes consist of several barriers to ensure sufficient reduction of the various materials that need to be controlled and to allow for normal variations in the performance of each barrier. As in all treatment processes, monitoring is important in order to check that the processes are working properly and efficiently. **Membrane filtration, reverse osmosis, advanced oxidation, riverbank filtration, and constructed wetlands** may comprise a component part of a multi-barrier treatment process. Not all of the processes are needed in all situations.

Water Purification Plants and Water Purification Processes

Water purification plants and water purification processes are used by some communities to maximize the sustainability of their raw water supplies. Strategies vary from the discharge to

filters for drinking industries. Water quality water is ng and computer ey are used to

wastewater ed treatments d wetland and/ nent followed rification plants, has membrane

multi-barrier treatments

filtration, reverse osmosis, advanced oxidation, clarification, ozonation, activated carbon adsorption, and final disinfection. The water produced by such treatments together is of such high quality that it can be used to replenish drinking water supplies directly though this is, as yet, rarely done.





Recommendations for all Water Professionals

- ALL water professionals must be aware of the impacts of the words they use
 - avoid using jargon, acronyms, and stigmatizing terms

Acronyms

Jargon

Stigma

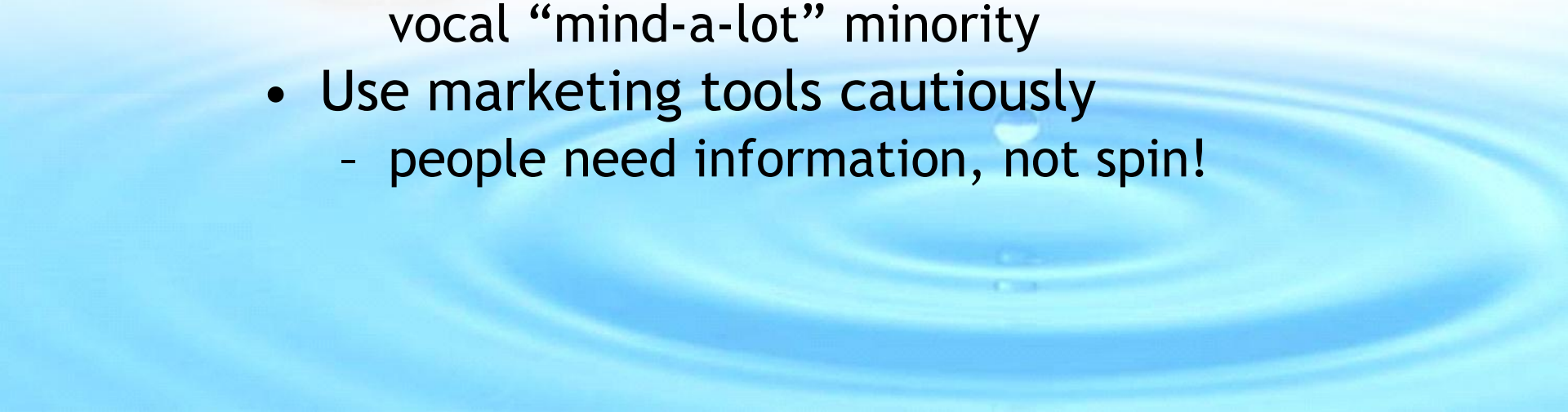


Recommendations for all Water Professionals

- Be proactive with the media
 - don't leave it up to reporters who are likely to sensationalize the negative aspects of water recycling
 - provide them with information early and frequently!
 - the water industry **cannot** and should not rely on the media to relay information about water recycling, but **should work with** the media and to find opportunities for more in-depth briefings on the issue of water reuse

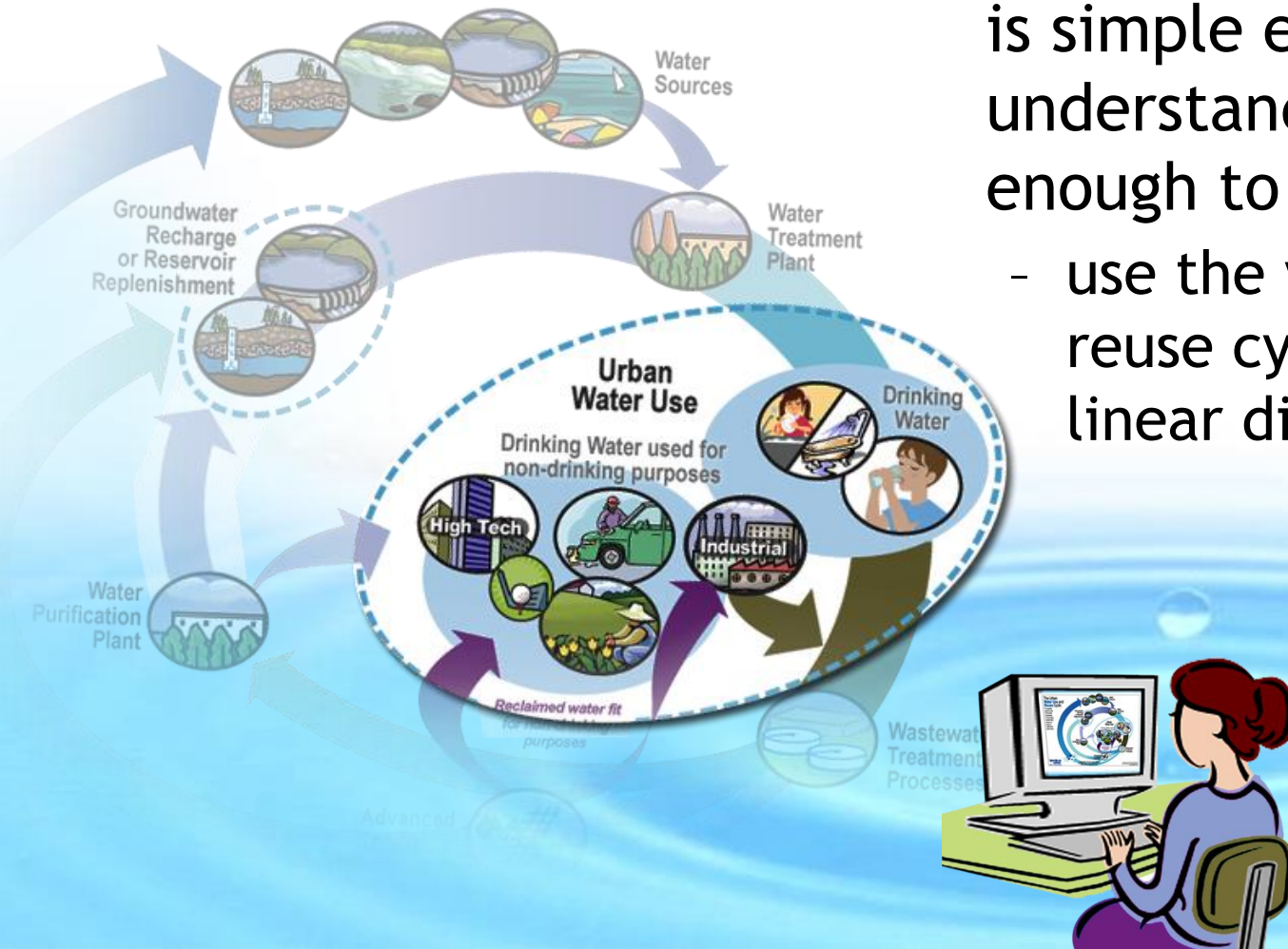


Recommendations for all Water Professionals

- Recognize that the community can be your ally!
 - nurture opinion leaders in the community by providing them with robust knowledge of water science, treatment, and water quality
 - they will in turn reassure the doubtful and counteract the influence of the vocal “mind-a-lot” minority
 - Use marketing tools cautiously
 - people need information, not spin!
- 


Recommendations for all Water Professionals

- Provide information that is simple enough to understand but technical enough to trust
 - use the water use and reuse cycle instead of linear diagrams





Recommendations for universities

- Teach the *Urban Water Cycle!*
 - help people understand the interconnectedness
 - Emphasize the need for communication with the lay community
 - help people learn how to do this
- 

Recommendations for utility managers

- The water industry must gain community acceptance of recycling if it is to achieve sustainable water management
 - information/education enhances acceptance and is essential to build trust
 - this aspect of project design should be funded liberally and early





Recommendations for professional organizations

- Encourage your members to think about the WHOLE water cycle!

“The ‘clean water suppliers’ and the ‘others who treat wastewater’ can no longer remain at arm’s length; they have to accept that they are dealing with a single resource that cycles through a complex of quality phases, all of them interlinked.”

- Bruce Durham, EUREAU Water Recycling and Reuse Working Group





Recommendations for professional organizations

- Be proactive!
 - let the community know you're there, thinking about their water and their environment... working for them!
- Encourage members to talk about water quality, not water history

Acronyms

Jargon

**Recycled
wastewater**

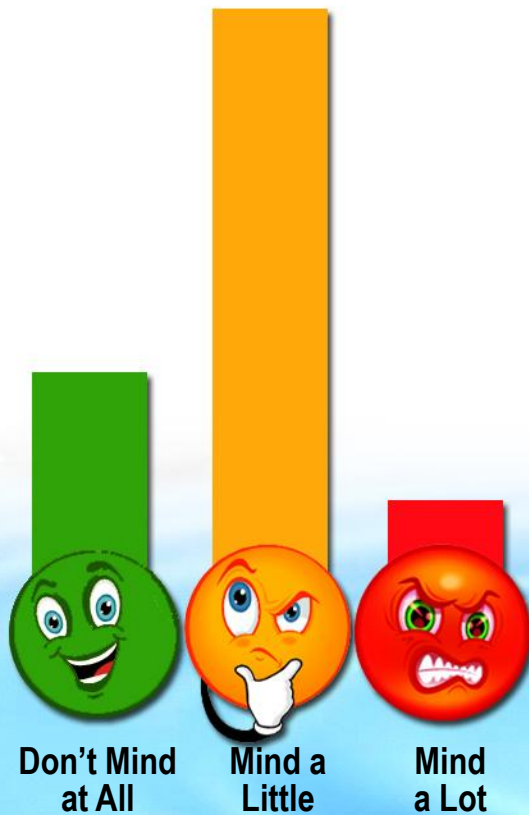


Recommendations for community outreach and consultation experts

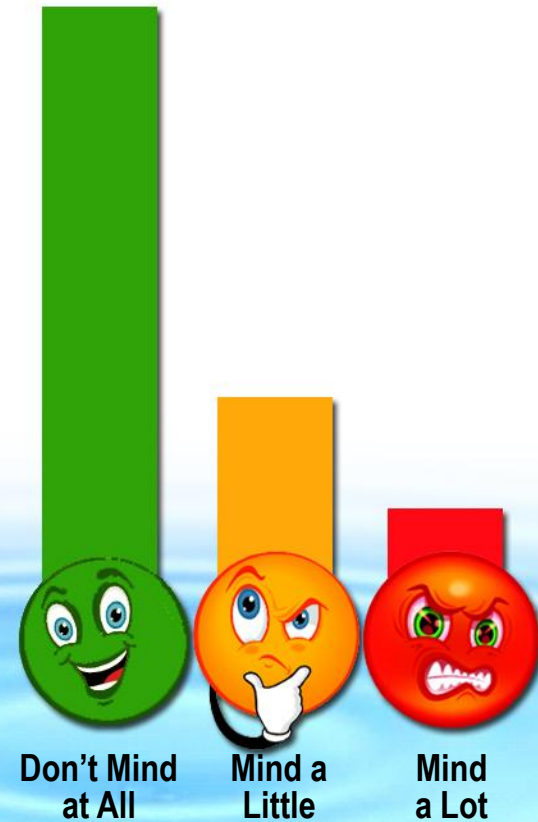
- Be proactive
 - Make sure that information is provided before consultation is initiated
- Be knowledgeable
 - Be able to explain water science or have experts at-hand who can provide this information
- Make the information available to suit various learning styles
- Use tours, diagrams and hands-on experiences that make learning fun
- Don't focus a lot on the Mind a Lots

Mind a Lots don't change their mind...
even with information!

BEFORE



AFTER





Recommendations for researchers

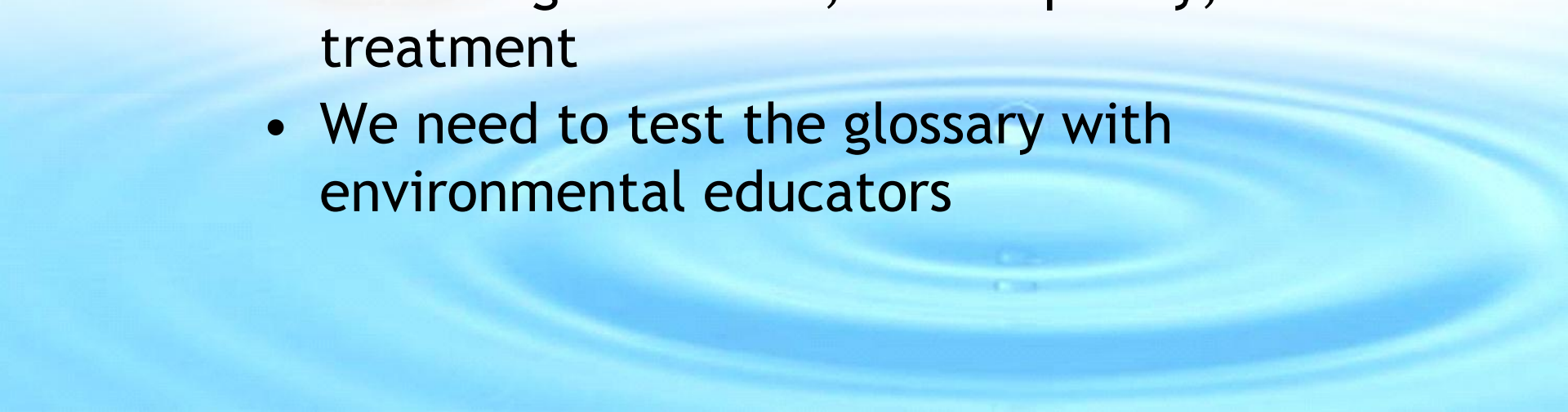
- Put the issue into context
 - explain detection and concentration and the differences between various qualities of water
- The term "risk" means something different to researchers than the public
 - for the public, discuss safety assurance rather than risk management

How dangerous is it *really*?





Recommendations for additional research

- We need better information on what detection means - and how to put the information in context
 - We need better ways to respond to public expectations of “zero”
 - We need annual survey research on public knowledge of water, water quality, water treatment
 - We need to test the glossary with environmental educators
- 

Recommendations for regulators

- Better explain the need for environmental barriers, if any
 - make it clear when an environmental barrier (like groundwater replenishment) has a treatment component
- Streamline the rules
 - beware of creating a whole new set of rules... regulations for drinking water and regulations for reclaimed drinking water - ***why are they different?***
- Don't require signage that labels reclaimed water like hazardous waste

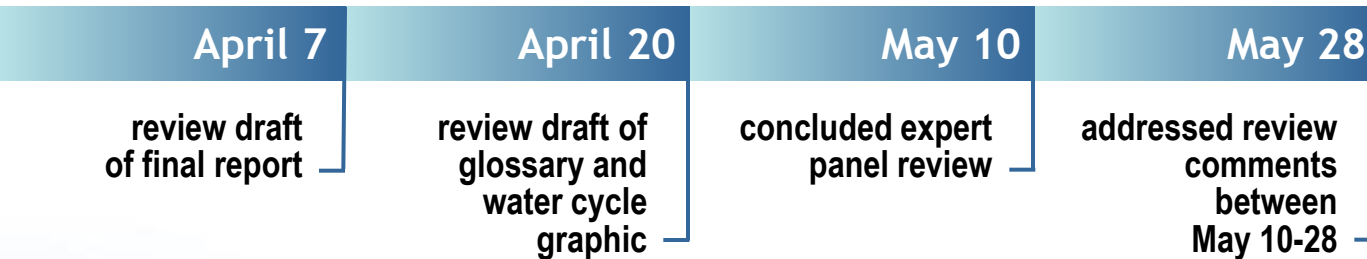


Next Steps

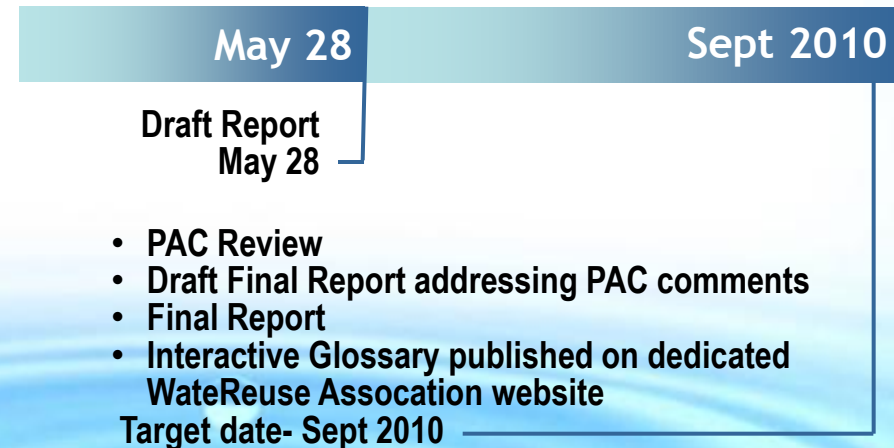


Draft Report Expert Review Timeline

Where we've been:

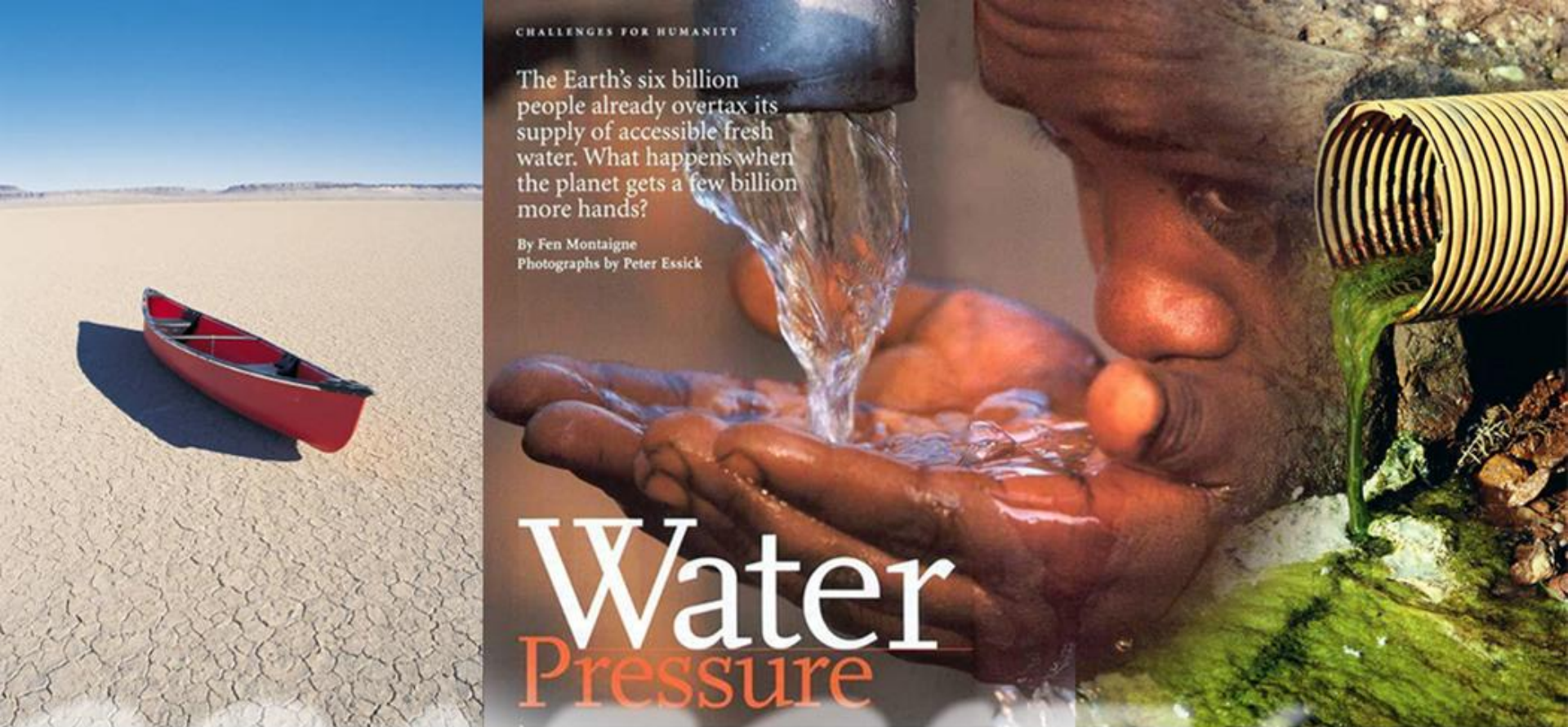


Next Steps



How will we meet the coming challenges?





CHALLENGES FOR HUMANITY

The Earth's six billion people already overtax its supply of accessible fresh water. What happens when the planet gets a few billion more hands?

By Fen Montaigne
Photographs by Peter Essick

Water Pressure

Water reuse and desalination are needed solutions for a thirsty planet

SCARCITY



BOUNTY

Words and images matter!

BOUNTY



Thank You!
**Questions
& Answers**